

Amdt. dated June 17, 2004

Reply to Office action of March 17, 2004

REMARKS/ARGUMENTS

The present paper is in response to the Office Action mailed March 17, 2004, in which Claims 1 through 29 were rejected. Applicants have thoroughly reviewed the outstanding Office Action including the Examiner's remarks and the reference cited therein. The following remarks are believed to be fully responsive to the Office Action and are believed to render all claims at issue patentably distinguishable over the cited references.

No claim is amended herein. No claim is cancelled. No claim is added. Accordingly, Claims 1 through 29 remain pending.

Applicants respectfully request reconsideration in light of the following remarks.

CLAIM REJECTIONS - 35 U.S.C. SECTION 103(a)

The Examiner rejected Claims 1 through 29 under 35 U.S.C. Section 103(a) as being unpatentable over Hirukawa (2003/0103196 or "Hirukawa I") in view of Hirukawa *et al.* (U.S. 5,703,675 or "Hirukawa II"). Of the rejected claims, only Claims 1, 6 and 18 are independent.

Applicants respectfully traverse this rejection.

This rejection is respectfully traversed on the basis that neither Hirukawa I (2003/0103196) nor Hirukawa II (U.S. 5,703,675) disclose every element of the claimed invention nor do these references teach, suggest or otherwise disclose

the invention as claimed whether taken alone or in combination. Moreover, the proposed modification of Hirukawa I (2003/0103196) and Hirukawa II (U.S. 5,703,675) would change their principles of operation. Thus Applicants respectfully submit that the combination of Hirukawa I (2003/0103196) and Hirukawa II (U.S. 5,703,675) is insufficient to render the claimed invention unpatentable.

Particularly, Hirukawa I (2003/0103196) discloses an exposure method and an exposure apparatus. FIG. 1 of Hirukawa I (2003/0103196) shows the exposure apparatus. The exposure method of Hirukawa I (2003/0103196) includes two steps of pattern transfer to reduce the random error at the time of exposure and to form a fine pattern with a good accuracy. The exposure method of Hirukawa I (2003/0103196) also reduces the changes in line widths of device patterns due to defocusing and realization of the line widths close to the line widths in the case of exposure by the best focus for all patterns. As described in paragraphs 0100 to 0138 of Hirukawa I (2003/0103196), the exposure method of Hirukawa I (2003/0103196) uses the first reticle R1 with reticle patterns comprised of dense patterns 41a of shapes corresponding to the dense patterns 41c of the device patterns and dense patterns similar to the dense patterns 41a formed by patterns 42a of shapes corresponding to the isolated patterns 42c of the device patterns plus a plurality of auxiliary patterns 43a in their vicinity as shown in FIG. 2A to 2C of Hirukawa I (2003/0103196). The exposure method of Hirukawa I (2003/0103196) also uses the second reticle R2 having reticle patterns comprised of dense patterns 41b of shapes corresponding to the dense patterns 41c of the

device patterns and isolated patterns 42b of shapes corresponding to the isolated patterns 42c of the device patterns as shown in FIG. 2A to 2C of Hirukawa I (2003/0103196). Hirukawa I (2003/0103196) actually discloses a photomask or reticle (R2) with a dense pattern and an isolated pattern as does Hirukawa II (U.S. 5,703,675).

However, the exposure method of Hirukawa I (2003/0103196) must use two reticles with different or the same patterns to expose twice so that the random error at the time of exposure can be reduced and a fine pattern with a good accuracy can be obtained. Furthermore, the changes in line widths of device patterns due to defocus can be reduced and line widths close to the line widths in the case of exposure by the best focus for all patterns can be realized. For example, the dense patterns 41c and the isolated patterns 42c of the device patterns with sharp line widths as shown in FIG. 2C must be formed by two exposure steps each with half of the total amount of exposure. One exposure step transfers the dense patterns 41a of shapes and the patterns 42a of shapes plus a plurality of auxiliary patterns 43a in the vicinity of the first reticle R1 with half of the total amount of exposure onto the photoresist layer. This exposure step would not render the photoresist layer developable since only half of the total amount of exposure energy is received. The other exposure step transfers the dense patterns 41b of shapes and the patterns 42b of shapes of the first reticle R2 with half of the total amount of exposure onto the photoresist layer. After a developing process, the dense patterns 41c and the isolated patterns 42c of the

device patterns are formed. It is quite clear that the exposure method of Hirukawa I (2003/0103196) must use two reticles with different or the same patterns and two exposure steps each with half of the total amount of exposure energy to form device patterns with fine line widths and good accuracy.

Hirukawa II (U.S. 5,703,675) discloses a projection-exposing apparatus having a mask which has a pattern formed with a pitch P_R , an illuminating optical system for applying illuminating light from a light source to the mask, a projection optical system for projecting an image of the pattern onto a photosensitive substrate, and a deflecting grating member formed with a pitch P_G disposed between the light source and the pattern of the mask for generating diffracted light. The pitch P_G of the deflecting grating member is defined in the relation $P_G = 2P_R$. Hirukawa II (U.S. 5,703,675) only discloses a photomask or reticle with a dense pattern and an isolated pattern. Thus the teaching of Hirukawa II (U.S. 5,703,675) is not sufficient to render the claimed invention *prima facie* obvious under Hirukawa I (2003/0103196).

Thus Applicants respectfully submit that the combination of Hirukawa I (2003/0103196) and Hirukawa II (U.S. 5,703,675) is insufficient to render the claimed invention unpatentable.

Reconsideration and withdrawal of the rejections under 35 U.S.C. Section 103(a) are respectfully requested.

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CONCLUSION

In light of the above remarks, Applicants respectfully submit that all pending Claims 1 through 29 as currently presented are in condition for allowance. If, for any reason, the Examiner disagrees, please call the undersigned attorney at 248-433-7552 in an effort to resolve any matter still outstanding *before* issuing another action. The undersigned attorney is confident that any issue which might remain can readily be worked out by telephone.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,



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